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8.4 NUMBER OF HOPPING FREQUENCY USED

LIMIT

§15.247(a)(1)(iii) For frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

TEST SETUP



TEST PROCEDURE

- 1 Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
- 2 Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- 3 Set the spectrum analyzer on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- 4 Set the spectrum analyzer on View mode and then plot the result on spectrum analyzer screen.
- 5 Repeat above procedures until all frequencies measured were complete.



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TEST RESULTS

Model Name	AT-LP70XBT	Test By	Peter Chu
Temp & Humidity	22.5°C, 45%	Test Date	2023/12/27

Modulation Type: GFSK / DH5

Result(No.of CH)	Limit(No.of CH)	Result
79	>15	PASS

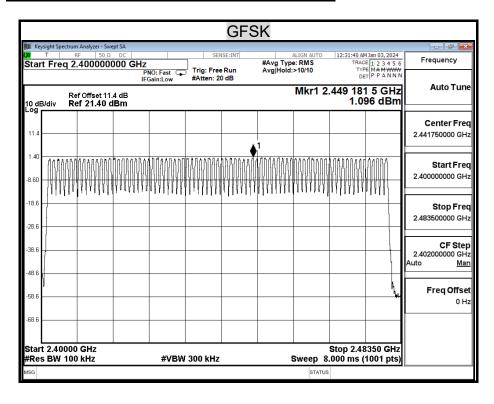
Modulation Type: 8-DPSK / 3-DH5

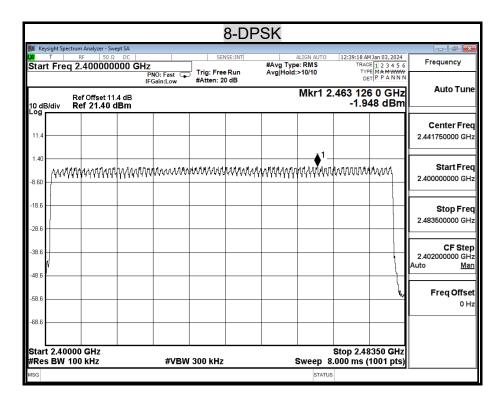
Result(No.of CH)	Limit(No.of CH)	Result
79	>15	PASS



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NUMBER OF HOPPING FREQUENCY USED







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8.5 DWELL TIME ON EACH CHANNEL

LIMIT

§15.247(a)(1)(iii) For frequency hopping system operating in the 2400-2483.5MHz band, the average time of occupancy on any frequency shall not be greater than 0.4 second within a 31.6 second period.

TEST SETUP



TEST PROCEDURE

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- 3. Adjust the center frequency of spectrum analyzer on any frequency be measured and set spectrum analyzer to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- 4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- 5. Repeat above procedures until all frequencies measured were complete.
- 6. The Bluetooth Headset has 3 type of payload, DH1, DH3, DH5. The hopping rate is 1600 per second. The longer the payload is, the slower the hopping rate is.



TEST RESULTS

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Time of occupancy on the TX channel in 31.6sec = time domain slot length × hop rate \div number of hop per channel × 31.6

Refer to the attached graph.

The hopping rates of Bluetooth devices change with different types of payload. The longer the payload is, the slower the hopping rate. The hopping rate scenario is defined in Bluetooth core specification.

Model Name	AT-LP70XBT	Test By	Peter Chu
Temp & Humidity	22.5°C, 45%	Test Date	2023/12/27

Modulation Type: GFSK / DH5

Transmitting Frequency	Packet type	Dwell time (ms)	Time of occupancy on the TX channel in 31.6sec (ms)	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Result
2441MHz	DH1	0.400	128.00	400	PASS
2441MHz	DH3	1.665	266.40	400	PASS
2441MHz	DH5	2.900	309.33	400	PASS
2441MHz	AFH	2.900	154.67	400	PASS

DH1 Dwell tine= 0.400 ms× $(1600 \div 2) \div 79 \times 31.6 = 128.00$ (ms) DH3 Dwell tine= 1.665 ms× $(1600 \div 4) \div 79 \times 31.6 = 266.40$ (ms) DH5 Dwell tine= 2.900 ms× $(1600 \div 6) \div 79 \times 31.6 = 309.33$ (ms) AFH Dwell tine= 2.900 ms× $(800 \div 6) \div 20 \times 8 = 154.67$ (ms)

Modulation Type: 8-DPSK / 3-DH5

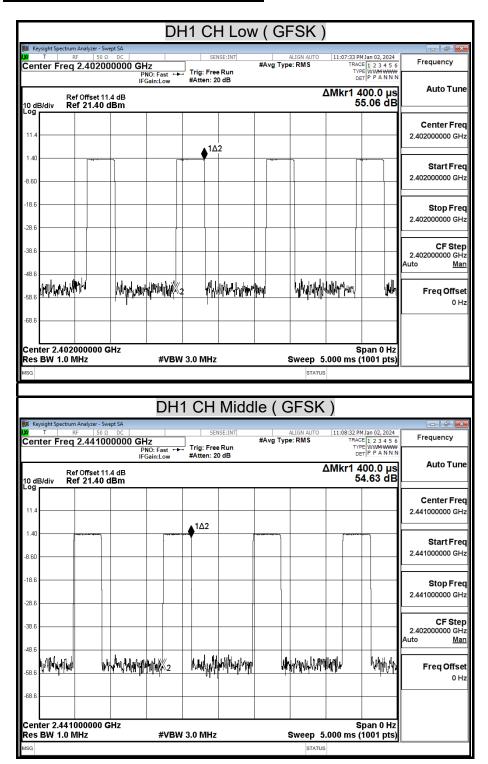
Transmitting Frequency	Packet type	Dwell time (ms)	Time of occupancy on the TX channel in 31.6sec (ms)	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Result
2441MHz	3DH1	0.400	128.00	400	PASS
2441MHz	3DH3	1.665	266.40	400	PASS
2441MHz	3DH5	2.900	309.33	400	PASS
2441MHz	AFH	2.900	154.67	400	PASS

3DH1 Dwell tine= $0.400 \text{ ms} \times (1600 \div 2) \div 79 \times 31.6 = 128.00 \text{ (ms)}$ 3DH3 Dwell tine= $1.665 \text{ ms} \times (1600 \div 4) \div 79 \times 31.6 = 266.40 \text{ (ms)}$ 3DH5 Dwell tine= $2.900 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 309.33 \text{ (ms)}$ AFH Dwell tine= $2.900 \text{ ms} \times (800 \div 6) \div 20 \times 8 = 154.67 \text{ (ms)}$



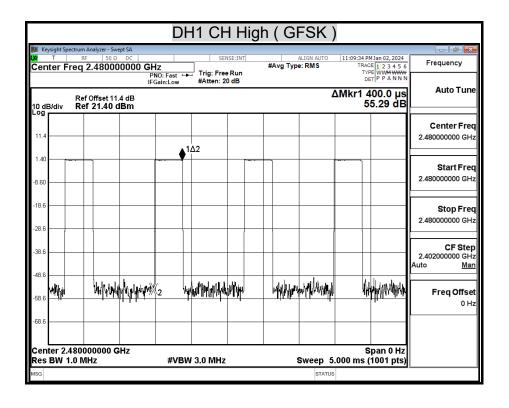
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DWELL TIME ON EACH PAYLOAD



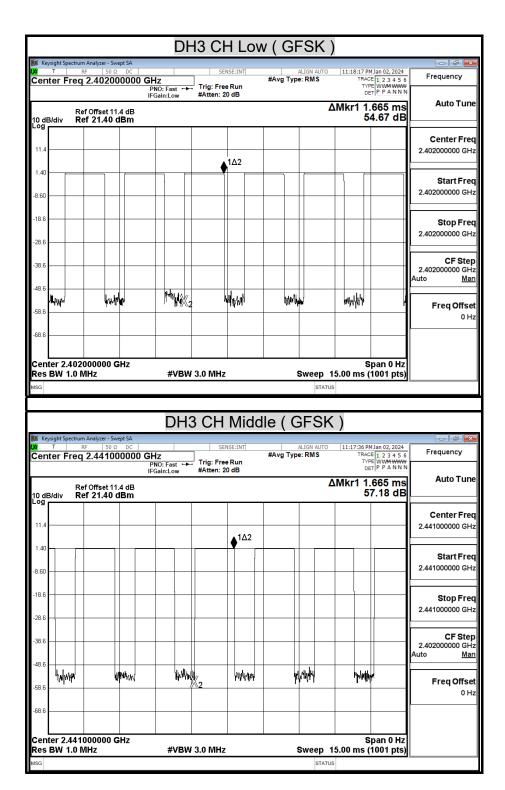


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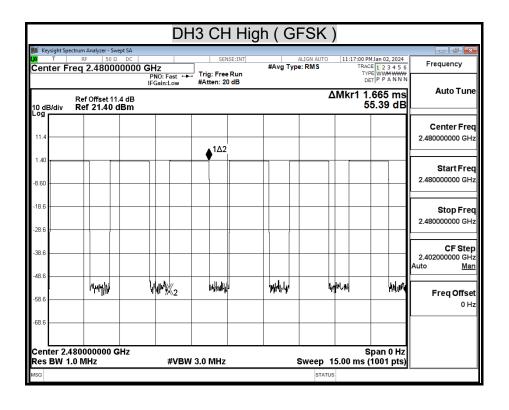


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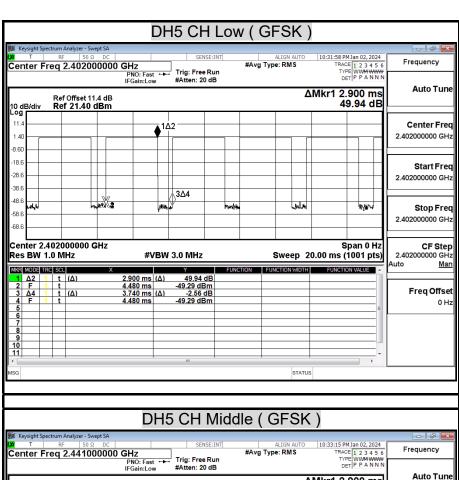


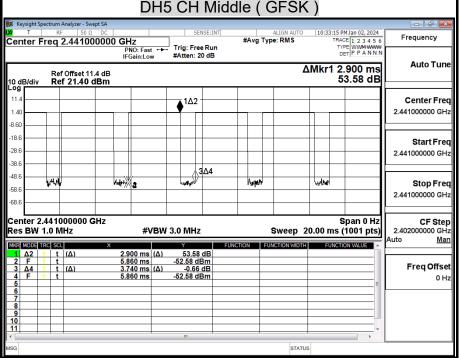
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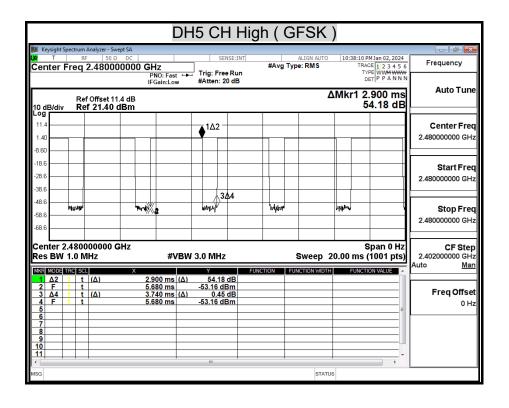
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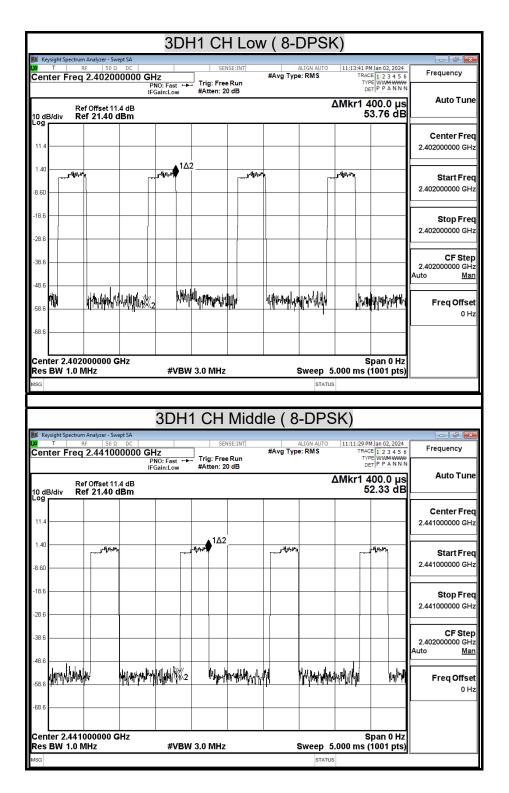


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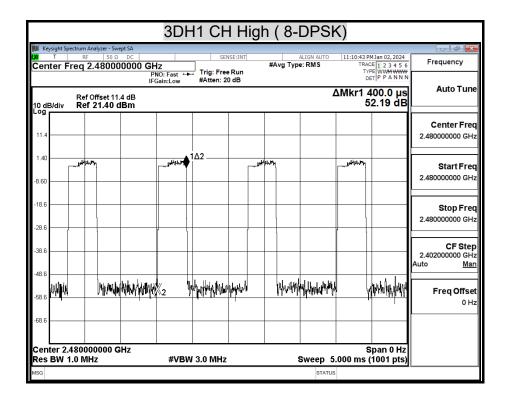


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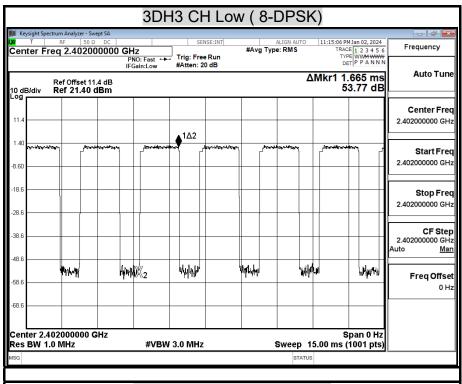


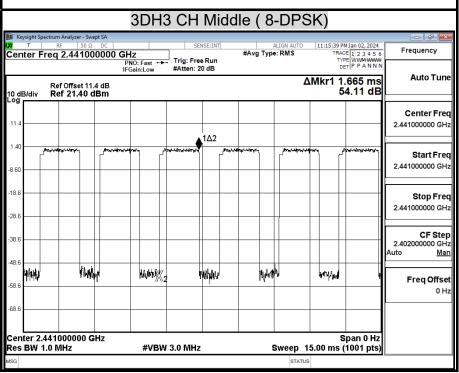
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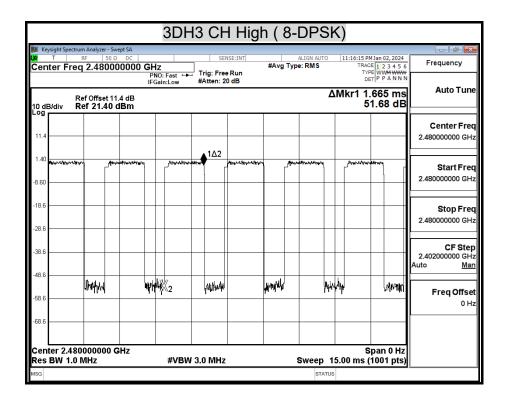
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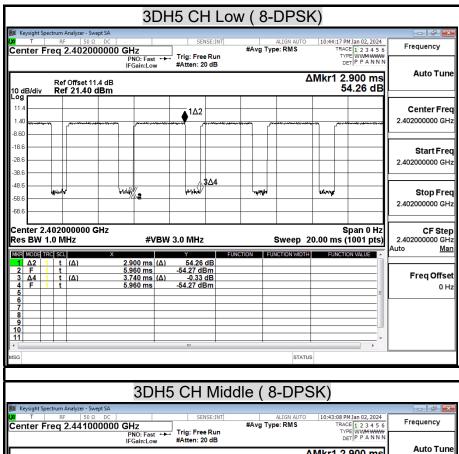


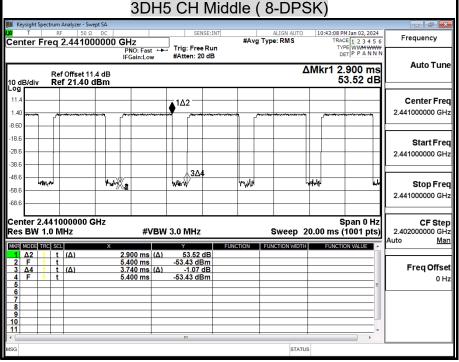
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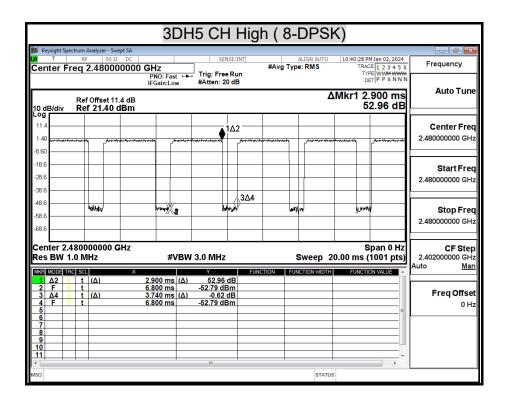
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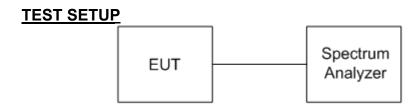


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8.6 DUTY CYCLE

LIMIT

Nil (No dedicated limit specified in the Rules)



TEST PROCEDURE

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)



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TEST RESULTS

No non-compliance noted.

TEST DATA

Model Name	AT-LP70XBT	Test By	Peter Chu
Temp & Humidity	22.5°C, 45%	Test Date	2023/12/27

Modulation Type: GFSK / DH5

	us	Times	Ton(us)	Total Ton time(ms)
Ton1	2900	1	2900	
Ton2		0	0	
Ton3			0	2.9
Тр				3.74

Ton	2.90
Tp(Ton+Toff)	3.74
Duty Cycle	0.78
Duty Factor	1.10

Modulation Type: 8-DPSK / 3-DH5

	us	Times	Ton(us)	Total Ton time(ms)
Ton1	2900	1	2900	
Ton2		0	0	
Ton3			0	2.9
Тр				3.74

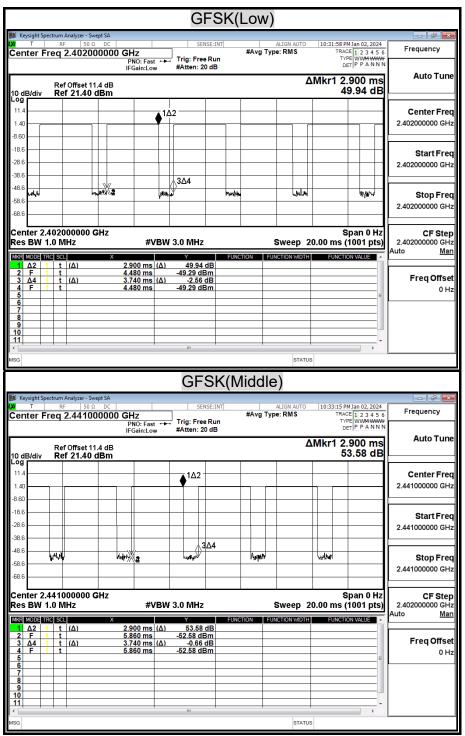
Ton	2.90
Tp(Ton+Toff)	3.74
Duty Cycle	0.78
Duty Factor	1.10



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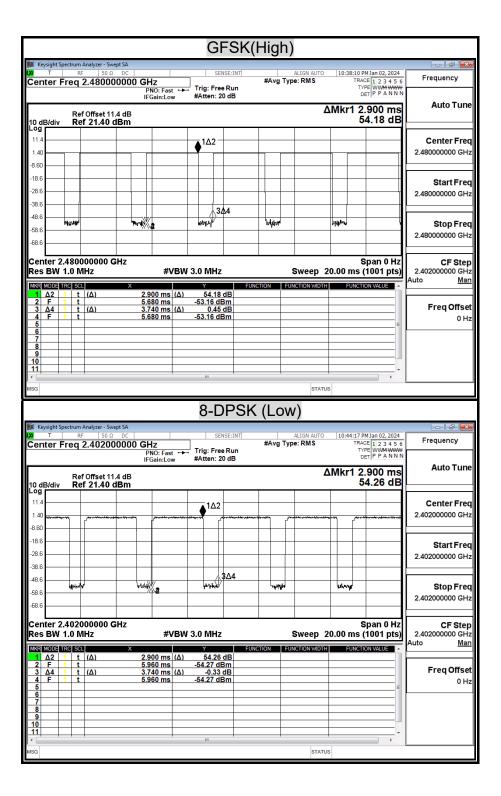
TEST PLOT

Duty Cycle



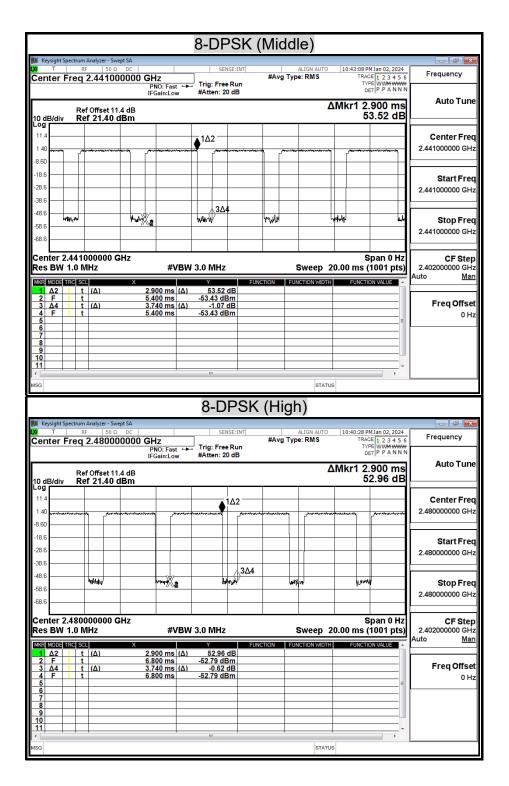


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8.7 CONDUCTED SPURIOUS EMISSION

LIMITS

§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the and that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

TEST SETUP



TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26.5 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

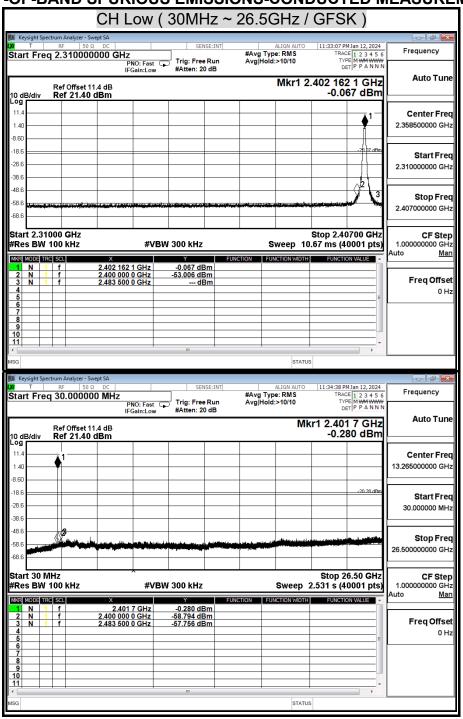


TEST RESULTS

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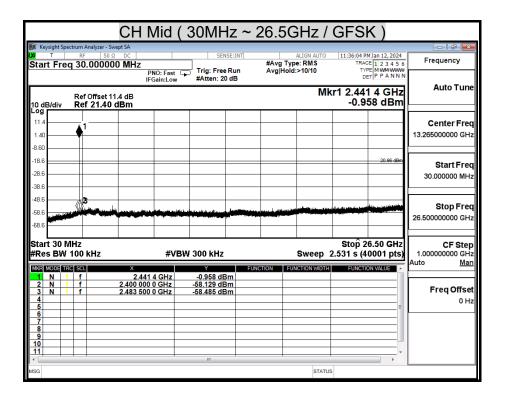
Model Name	AT-LP70XBT	Test By	Peter Chu
Temp & Humidity	22.5°C, 45%	Test Date	2023/12/27

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT





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CH High (30MHz ~ 26.5GHz / GFSK) Start Freq 2.475000000 GHz #Avg Type: RMS Avg|Hold:>10/10 Frequency **Auto Tune** Mkr1 2.480 156 875 GHz Ref Offset 11.4 dB Ref 21.40 dBm 0.156 dBm Center Freq 2.487500000 GHz 8 60 -19.84 di 18.6 Start Freq 28 2.475000000 GHz 48.6 Stop Fred 2.500000000 GHz Start 2.47500 GHz Stop 2.50000 GHz **CF Step** 1.000000000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.667 ms (40001 pts) Auto Man MKR MODE TRC SCL 0.156 dBm --- dBm -58.486 dBm 2.480 156 875 GHz 2.400 000 0 GHz 2.483 500 0 GHz 1 N 1 f 2 N 1 f 3 N 1 f Freq Offset 0 Hz STATUS #Avg Type: RMS TYPE MY 11:39:44 PMJan 12, 2024

#Avg Type: RMS TRACE [1 2 3 4 5 6

TYPE M WARWWW DET P P A NN N Start Freq 30.000000 MHz Frequency PNO: Fast Trig: Free Run Auto Tune Mkr1 2.479 8 GHz Ref Offset 11.4 dB Ref 21.40 dBm -0.015 dBm Center Freq 13.265000000 GHz 18. -20.02.dE Start Fred 28 30.000000 MHz 38. 48 Stop Freq 26.500000000 GHz 68 F Start 30 MHz #Res BW 100 kHz Stop 26.50 GHz Sweep 2.531 s (40001 pts) CF Step 1.000000000 GHz **#VBW** 300 kHz Auto Man MKR MODE TRC SCL 2.479 8 GHz 2.400 000 0 GHz 2.483 500 0 GHz -0.015 dBm -58.103 dBm -57.993 dBm 1 N 1 f 2 N 1 f 3 N 1 f

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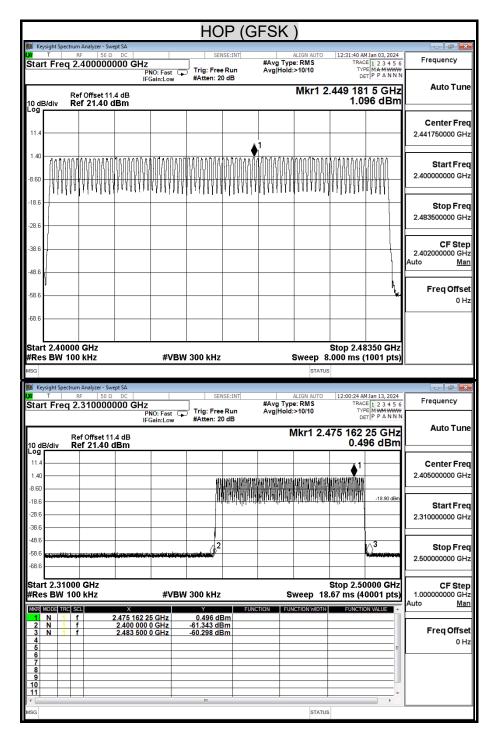
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Freq Offset 0 Hz

STATUS

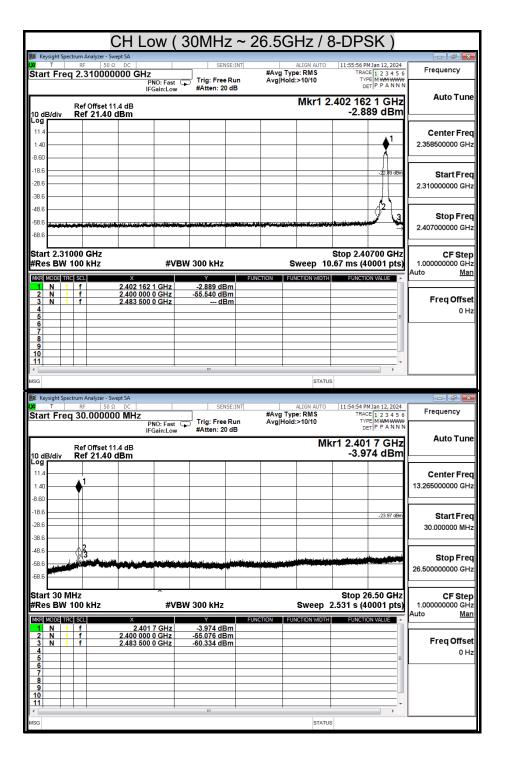


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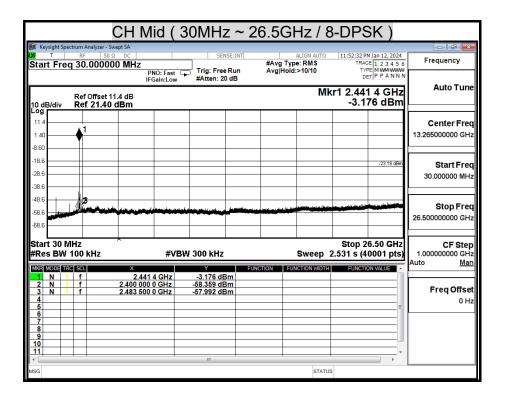


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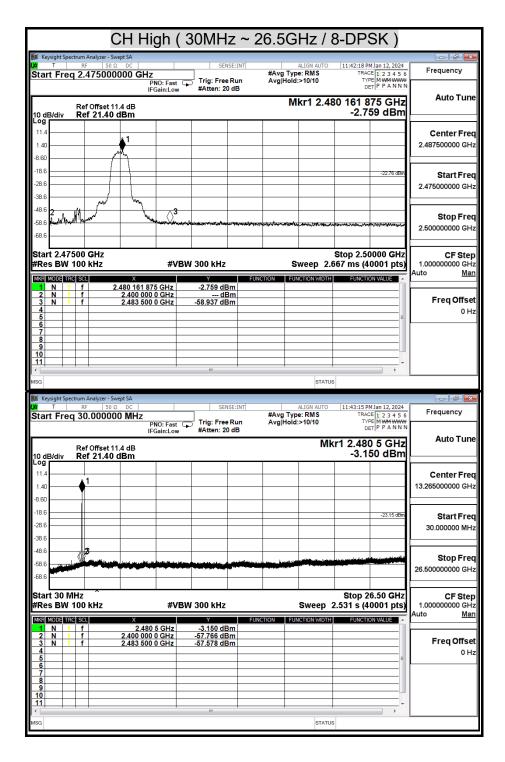


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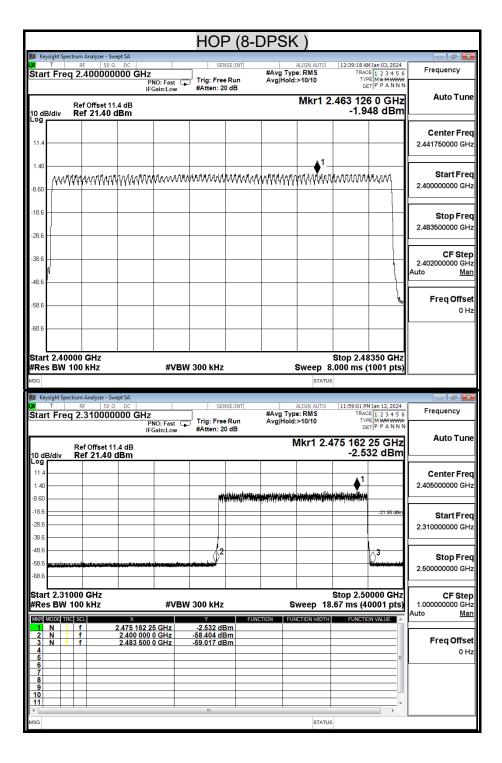


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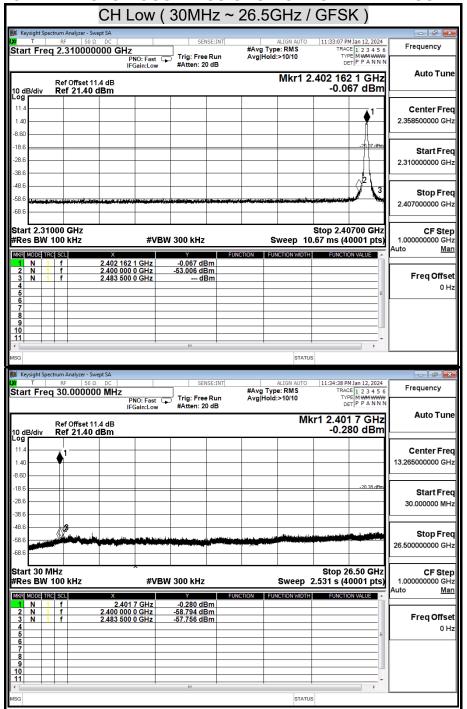




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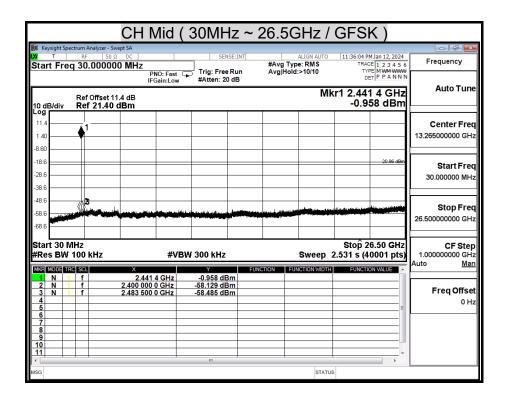
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OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT





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CH High (30MHz ~ 26.5GHz / GFSK) Start Freq 2.475000000 GHz #Avg Type: RMS Avg|Hold:>10/10 Frequency **Auto Tune** Mkr1 2.480 156 875 GHz Ref Offset 11.4 dB Ref 21.40 dBm 0.156 dBm Center Freq 2.487500000 GHz 8 60 -19.84 di 18.6 Start Freq 28 2.475000000 GHz 48.6 Stop Frea 2.500000000 GHz Start 2.47500 GHz Stop 2.50000 GHz **CF Step** 1.000000000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.667 ms (40001 pts) Auto Man MKR MODE TRC SCL 0.156 dBm --- dBm -58.486 dBm 2.480 156 875 GHz 2.400 000 0 GHz 2.483 500 0 GHz 1 N 1 f 2 N 1 f 3 N 1 f Freq Offset 0 Hz STATUS #Avg Type: RMS TYPE MY 11:39:44 PMJan 12, 2024

#Avg Type: RMS TRACE [1 2 3 4 5 6

TYPE M WARWWW DET P P A NN N Start Freq 30.000000 MHz Frequency PNO: Fast Trig: Free Run Auto Tune Mkr1 2.479 8 GHz Ref Offset 11.4 dB Ref 21.40 dBm -0.015 dBm Center Freq 13.265000000 GHz 18. -20.02.dE Start Fred 28 30.000000 MHz 38.8 48 Stop Freq 26.500000000 GHz 68 F Start 30 MHz #Res BW 100 kHz Stop 26.50 GHz Sweep 2.531 s (40001 pts) CF Step 1.000000000 GHz **#VBW** 300 kHz Auto Man MKR MODE TRC SCL 2.479 8 GHz 2.400 000 0 GHz 2.483 500 0 GHz -0.015 dBm -58.103 dBm -57.993 dBm 1 N 1 f 2 N 1 f 3 N 1 f Freq Offset 0 Hz

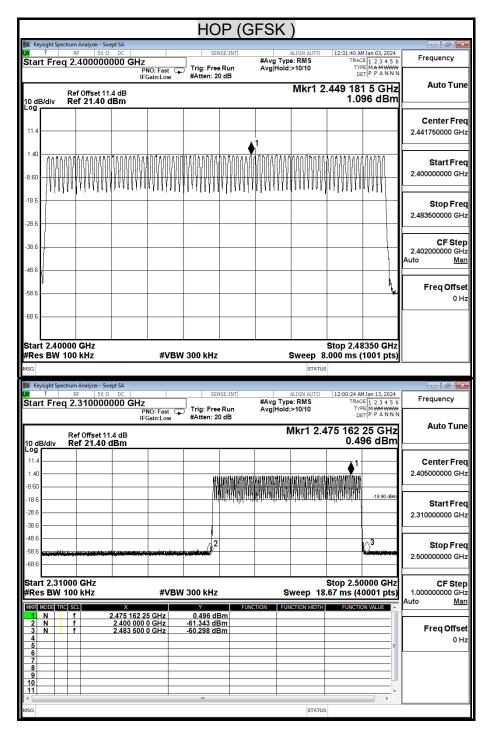
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STATUS

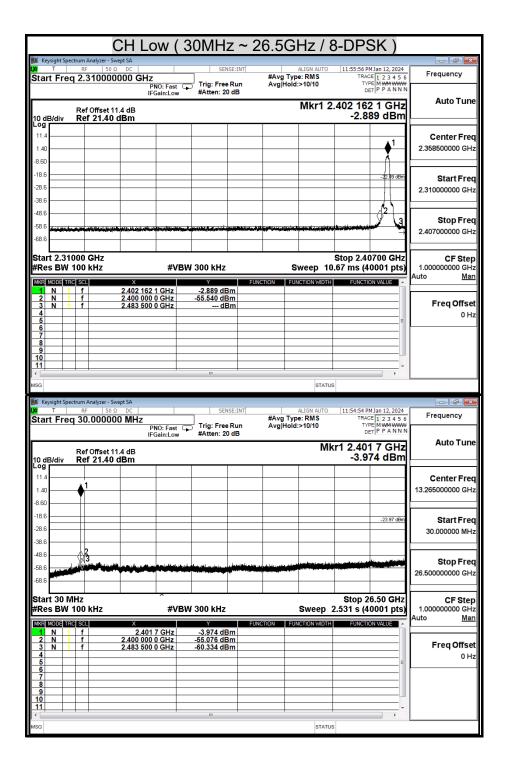


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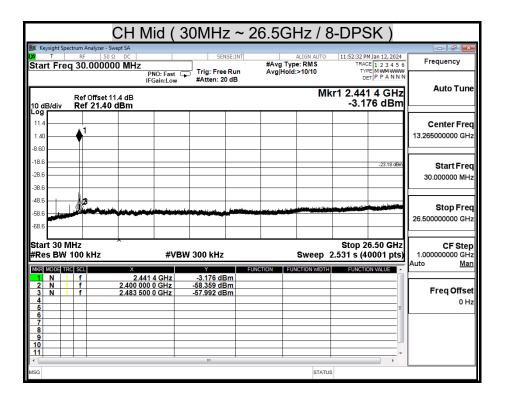




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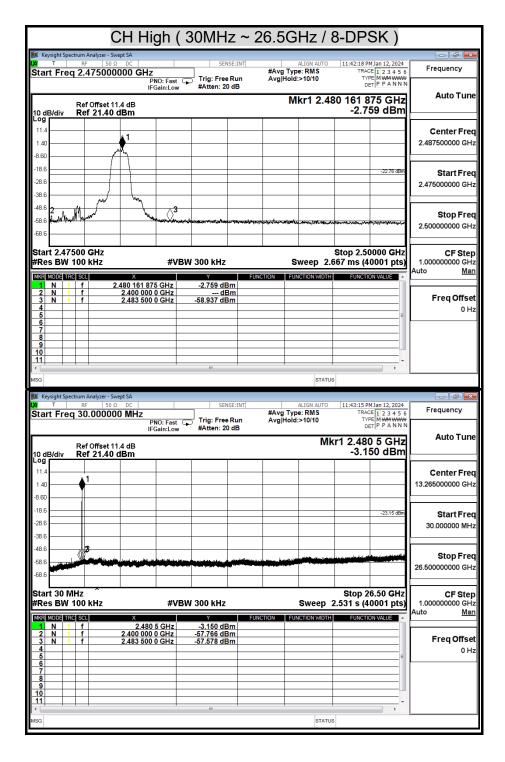


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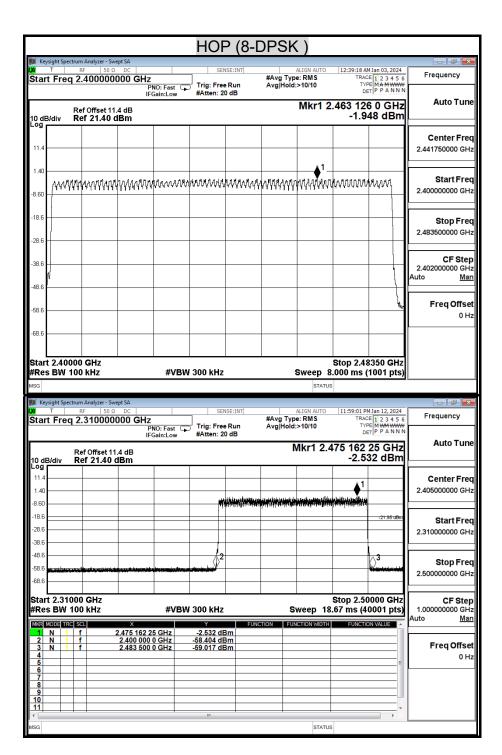


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8.8 RADIATED EMISSIONS

8.8.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

LIMITS

§ 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 -1710	10.6 -12.7
6.26775 - 6.26825	108 -121.94	1718.8 - 1722.2	13.25 -13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 – 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 -16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	(2)
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

§ 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown is Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

² Above 38.6



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§ 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

^{**} Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz, However, operation within these frequency bands is permitted under other sections of this Part, e-g, Sections 15.231 and 15.241.

§ 15.209 (b) In the emission table above, the tighter limit applies at the band edges.



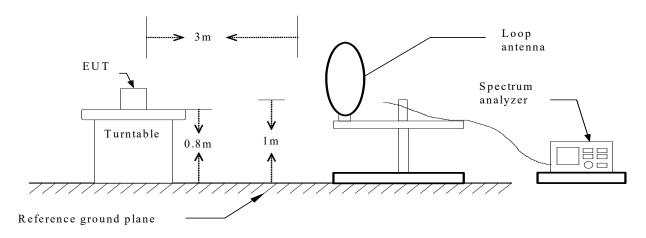
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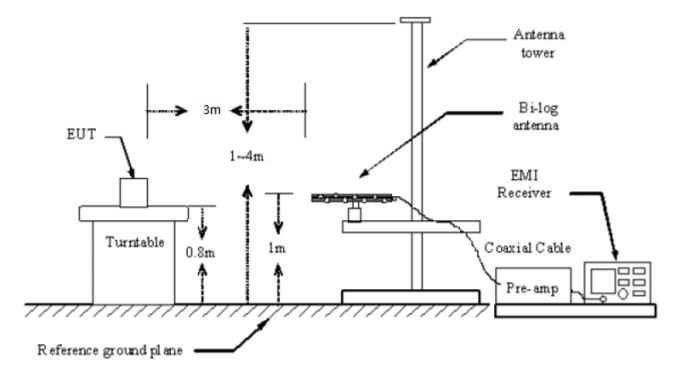
TEST SETUP

The diagram below shows the test setup that is utilized to make the measurements for emission from below 1GHz.

9kHz ~ 30MHz



30MHz ~ 1GHz

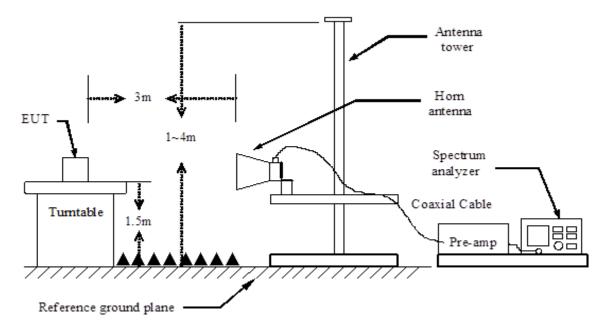




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The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



TEST PROCEDURE

- a. The EUT was placed on the top of a rotating table 0.8/1.5 meters above the ground at a 3 meter chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. While measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. While measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The spectrum analyzer was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. The tests were performed in accordance with 558074 D01 15.247 Meas Guidance v05Note:

NOTE:

- 1. The resolution bandwidth of test receiver is 200Hz for Quasi-peak detection (QP) at frequency 9~150(kHz).
- 2. The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) at frequency 0.15~30(MHz).



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3. The resolution bandwidth of test receiver is 120kHz for Quasi-peak detection (QP) at frequency 30~1000(MHz).

- 4. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.
- 5. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth $\leq 1/T$ for Average detection (AV) at frequency above 1GHz.

TEST RESULTS

No non-compliance noted



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8.8.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

BELOW 1 GHz (9kHz ~ 30MHz)

No emission found between lowest internal used/generated frequency to 30MHz.

BELOW 1 GHz (30MHz ~ 1GHz)

Test Voltage: AC 120V, 60Hz

Product Name	AUTOMATIC WIRELESS TURNTABLE	Test Date	2023/12/28
Model Name	AT-LP70XBT	Test By	Peter Chu
Test Mode	TX	Temp & Humidity	22.3°C, 49%

Vertical 80 Level (dBuV/m) Date: 2023-12-28 70 60 50 40 30 20 10 0<u>-</u> 30 100. 200. 300. 400. 500. 600. 700. 800. 900. 1000 Frequency (MHz) C.F Limit Freq Reading Result Margin Detector PK MHz dBuV dB dBuV/m dBuV/m dΒ 40.00 31.940 4.62 30.92 QΡ 26.30 -9.08 14.41 27.16 40.00 QΡ 52.310 12.75 -12.84 12.30 15.10 27.40 -12.60 QΡ 66.860 40.00 179.380 4.46 19.50 23.96 43.50 -19.54 QΡ 450.010 3.00 26.59 29.59 46.00 -16.41 QΡ 946.650 -2.34 34.65 32.31 46.00 -13.69 QP

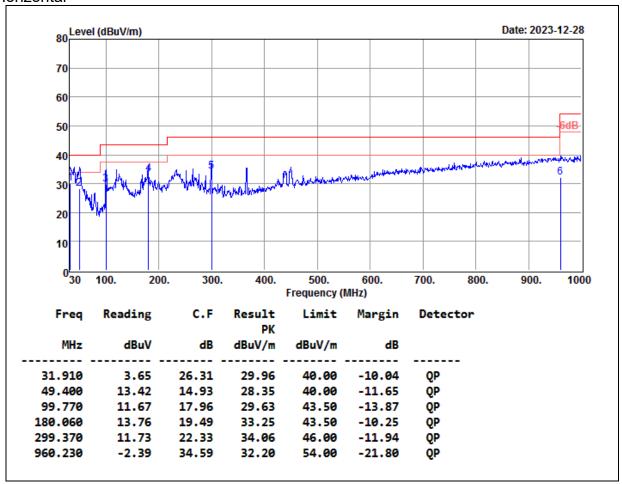
- 1.Test receiver setting QP(Qusai Peak): RBW=120kHz
- 2.C.F=Antenna Factor+Cable Loss
- 3. The result basic equation calculation is as follow: Result = Reading + C.F, Margin = Result-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.



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Product Name	AUTOMATIC WIRELESS TURNTABLE	Test Date	2023/12/28
Model Name	AT-LP70XBT	Test By	Peter Chu
Test Mode	TX	Temp & Humidity	22.3°C, 49%

Horizontal



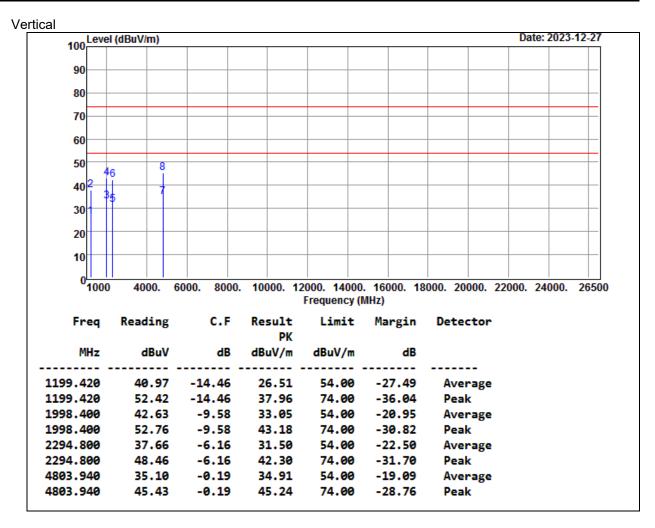
- 1.Test receiver setting QP(Qusai Peak): RBW=120kHz
- 2.C.F=Antenna Factor+Cable Loss
- 3. The result basic equation calculation is as follow: Result = Reading + C.F, Margin = Result-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.



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8.8.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

Product Name	AUTOMATIC WIRELESS TURNTABLE	Test Date	2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH Low TX / GFSK	TEMP& Humidity	21.8°C, 47%



- 1.Spectrum analyzer setting Peak: RBW=1MHz, VBW=3MHz, Average: RBW=1MHz, VBW≥1/T
- 2.C.F=Antenna Factor+Cable Loss-Preamplifier gain+2.4GHz~2.5GHz Filter Insertion Loss
- 3. The result basic equation calculation is as follow: Result = Reading + C.F, Margin = Result-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.

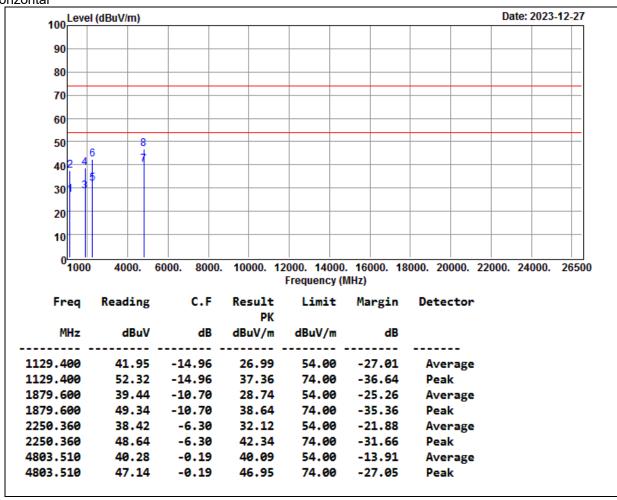


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Product Name	AUTOMATIC WIRELESS TURNTABLE	Test Date	2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH Low TX / GFSK	TEMP& Humidity	21.8°C, 47%

Horizontal



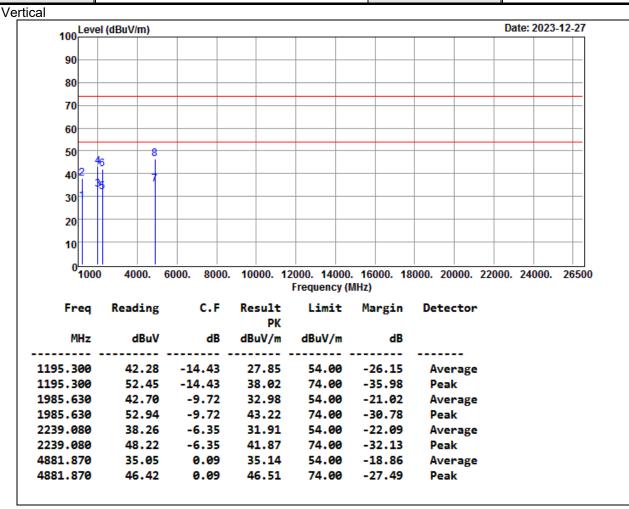
- 1.Spectrum analyzer setting Peak: RBW=1MHz, VBW=3MHz, Average: RBW=1MHz, VBW≥1/T
- 2.C.F=Antenna Factor+Cable Loss-Preamplifier gain+2.4GHz~2.5GHz Filter Insertion Loss
- 3. The result basic equation calculation is as follow: Result = Reading + C.F, Margin = Result-Limit
- 4. The other emission levels were 10dB below the limit
- 5.The test distance is 3m.



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Product Name	AUTOMATIC WIRELESS TURNTABLE	Test Date	2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH Mid TX / GFSK	TEMP& Humidity	21.8°C, 47%

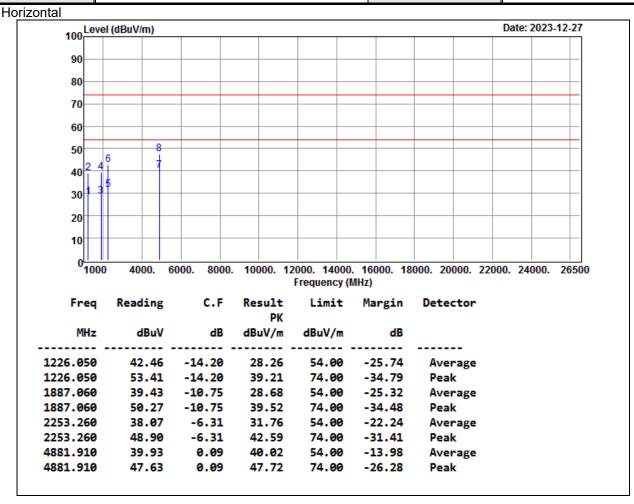


- 1.Spectrum analyzer setting Peak: RBW=1MHz, VBW=3MHz, Average: RBW=1MHz, VBW≥1/T
- 2.C.F=Antenna Factor+Cable Loss-Preamplifier gain+2.4GHz~2.5GHz Filter Insertion Loss
- 3. The result basic equation calculation is as follow: Result = Reading + C.F, Margin = Result-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.



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Product Name	AUTOMATIC WIRELESS TURNTABLE	Test Date	2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH Mid TX / GFSK	TEMP& Humidity	21.8°C, 47%

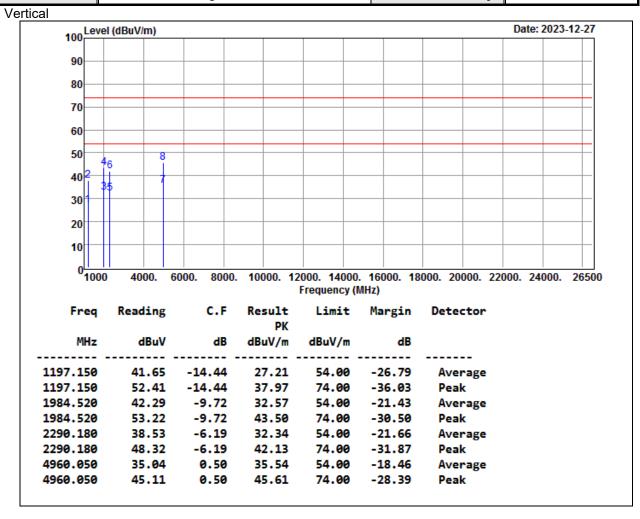


- 1.Spectrum analyzer setting Peak: RBW=1MHz, VBW=3MHz, Average: RBW=1MHz, VBW≥1/T
- 2.C.F=Antenna Factor+Cable Loss-Preamplifier gain+2.4GHz~2.5GHz Filter Insertion Loss
- 3. The result basic equation calculation is as follow: Result = Reading + C.F, Margin = Result-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.



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Product Name	AUTOMATIC WIRELESS TURNTABLE	Test Date	2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH High TX / GFSK	TEMP& Humidity	21.8°C, 47%



- 1.Spectrum analyzer setting Peak: RBW=1MHz, VBW=3MHz, Average: RBW=1MHz, VBW≥1/T
- 2.C.F=Antenna Factor+Cable Loss-Preamplifier gain+2.4GHz~2.5GHz Filter Insertion Loss
- 3. The result basic equation calculation is as follow: Result = Reading + C.F, Margin = Result-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.



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Product Name	AUTOMATIC WIRELESS TURNTABLE	Test Date	2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH High TX / GFSK	TEMP& Humidity	21.8°C, 47%

Horizontal 100 Level (dBuV/m) Date: 2023-12-27 90 80 70 60 50 40 30 20 10 8000. 10000. 12000. 14000. 16000. 18000. 20000. 22000. 24000. 26500 4000. 6000. 1000 Frequency (MHz) Freq Reading C.F Result Limit Margin Detector PK MHz dBuV dΒ dBuV/m dBuV/m dΒ 1226.520 42.48 -14.19 28.29 54.00 -25.71 Average 1226.520 38.14 -14.19 74.00 -35.86 52.33 Peak 1892.520 -10.66 28.58 54.00 -25.42 39.24 Average 1892.520 48.63 -10.66 37.97 74.00 -36.03 Peak 2258.260 38.40 -6.33 32.07 54.00 -21.93 Average 2258.260 48.24 -6.33 41.91 74.00 -32.09 Peak 4959.930 37.69 0.50 38.19 54.00 -15.81 Average 4959.930 45.95 0.50 46.45 74.00 -27.55 Peak

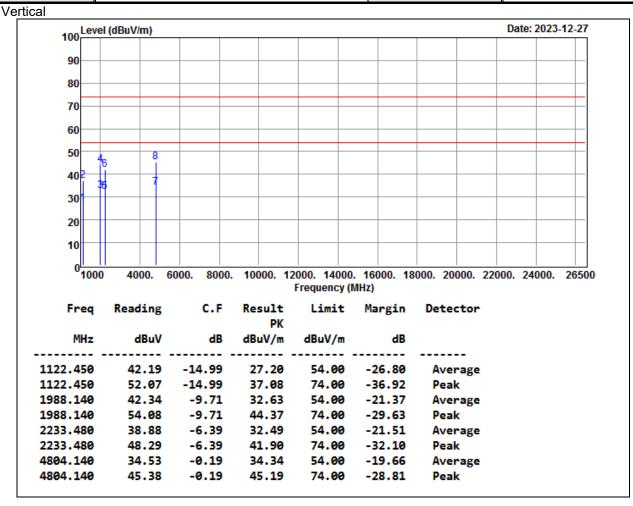
- 1.Spectrum analyzer setting Peak: RBW=1MHz, VBW=3MHz, Average: RBW=1MHz, VBW≥1/T
- 2.C.F=Antenna Factor+Cable Loss-Preamplifier gain+2.4GHz~2.5GHz Filter Insertion Loss
- 3. The result basic equation calculation is as follow: Result = Reading + C.F, Margin = Result-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.



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Product Name	AUTOMATIC WIRELESS TURNTABLE	Test Date	2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH Low TX / 8-DPSK	TEMP& Humidity	21.8°C, 47%



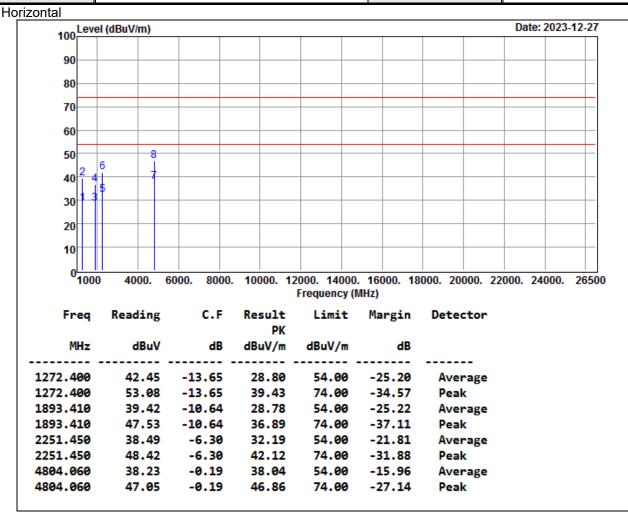
- 1.Spectrum analyzer setting Peak: RBW=1MHz, VBW=3MHz, Average: RBW=1MHz, VBW≥1/T
- 2.C.F=Antenna Factor+Cable Loss-Preamplifier gain+2.4GHz~2.5GHz Filter Insertion Loss
- 3. The result basic equation calculation is as follow: Result = Reading + C.F, Margin = Result-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.



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Product Name	AUTOMATIC WIRELESS TURNTABLE	Test Date	2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH Low TX / 8-DPSK	TEMP& Humidity	21.8°C, 47%

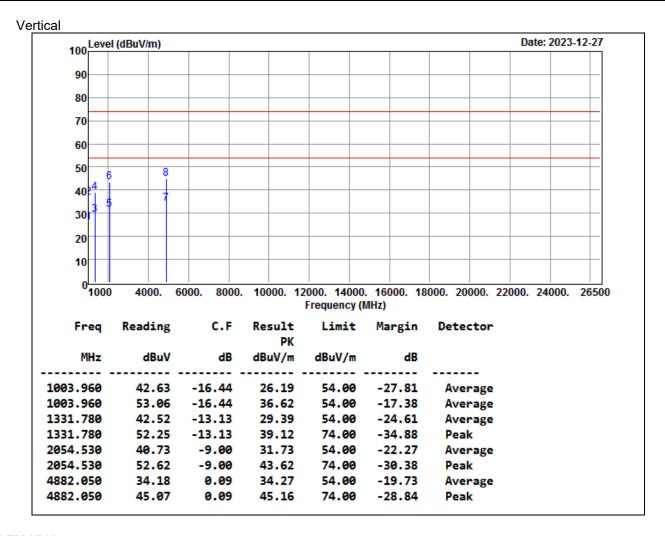


- 1.Spectrum analyzer setting Peak: RBW=1MHz, VBW=3MHz, Average: RBW=1MHz, VBW≥1/T
- 2.C.F=Antenna Factor+Cable Loss-Preamplifier gain+2.4GHz~2.5GHz Filter Insertion Loss
- 3. The result basic equation calculation is as follow: Result = Reading + C.F, Margin = Result-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.



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Product Name	AUTOMATIC WIRELESS TURNTABLE	Test Date	2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH Mid TX / 8-DPSK	TEMP& Humidity	21.8°C, 47%



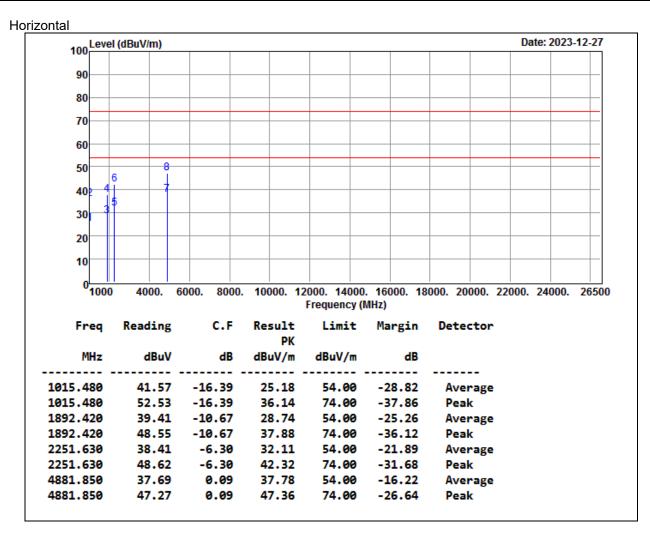
- 1.Spectrum analyzer setting Peak: RBW=1MHz, VBW=3MHz, Average: RBW=1MHz, VBW≥1/T
- 2.C.F=Antenna Factor+Cable Loss-Preamplifier gain+2.4GHz~2.5GHz Filter Insertion Loss
- 3. The result basic equation calculation is as follow: Result = Reading + C.F, Margin = Result-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.



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Product Name	AUTOMATIC WIRELESS TURNTABLE	Test Date	2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH Mid TX / 8-DPSK	TEMP& Humidity	21.8°C, 47%

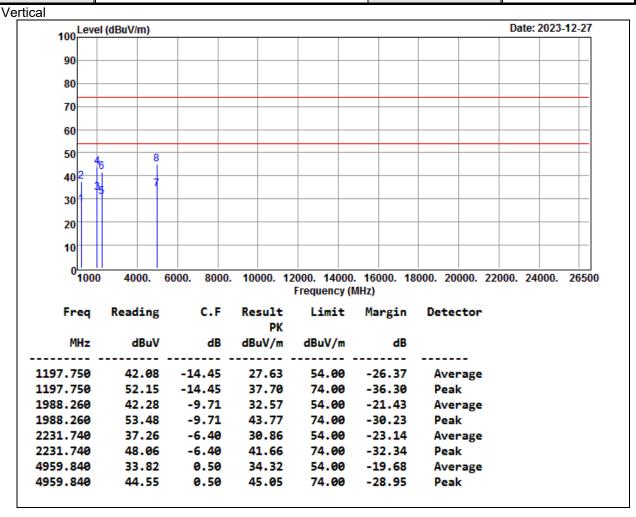


- 1.Spectrum analyzer setting Peak: RBW=1MHz, VBW=3MHz, Average: RBW=1MHz, VBW≥1/T
- 2.C.F=Antenna Factor+Cable Loss-Preamplifier gain+2.4GHz~2.5GHz Filter Insertion Loss
- 3. The result basic equation calculation is as follow: Result = Reading + C.F, Margin = Result-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.



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Product Name	AUTOMATIC WIRELESS TURNTABLE	Test Date	2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH High TX / 8-DPSK	TEMP& Humidity	21.8°C, 47%



- 1.Spectrum analyzer setting Peak: RBW=1MHz, VBW=3MHz, Average: RBW=1MHz, VBW≥1/T
- 2.C.F=Antenna Factor+Cable Loss-Preamplifier gain+2.4GHz~2.5GHz Filter Insertion Loss
- 3. The result basic equation calculation is as follow: Result = Reading + C.F, Margin = Result-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.



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Product Name	AUTOMATIC WIRELESS TURNTABLE	Test Date	2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH High TX / 8-DPSK	TEMP& Humidity	21.8°C, 47%

Horizontal 100 Level (dBuV/m) Date: 2023-12-27 90 80 70 60 50 40 30 20 10 0<mark>1000</mark> 4000. 8000. 10000. 12000. 14000. 16000. 18000. 20000. 22000. 24000. 26500 Frequency (MHz) Freq Reading C.F Result Limit Margin Detector PK MHz dBuV dB dBuV/m dB dBuV/m 1222.520 54.00 -26.20 42.04 -14.24 27.80 Average 1222.520 52.65 -14.24 38.41 74.00 -35.59 Peak 1889.270 38.28 -10.75 27.53 54.00 -26.47 Average 1889.270 48.54 -10.75 37.79 74.00 -36.21 Peak 2263.440 38.18 -6.30 31.88 54.00 -22.12 Average 2263.440 -6.30 41.96 74.00 -32.04 48.26 Peak 4959.960 35.29 0.50 35.79 54.00 -18.21 Average 4959.960 45.26 0.50 45.76 74.00 -28.24 Peak

- 1.Spectrum analyzer setting Peak: RBW=1MHz, VBW=3MHz, Average: RBW=1MHz, VBW≥1/T
- 2.C.F=Antenna Factor+Cable Loss-Preamplifier gain+2.4GHz~2.5GHz Filter Insertion Loss
- 3. The result basic equation calculation is as follow: Result = Reading + C.F, Margin = Result-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.



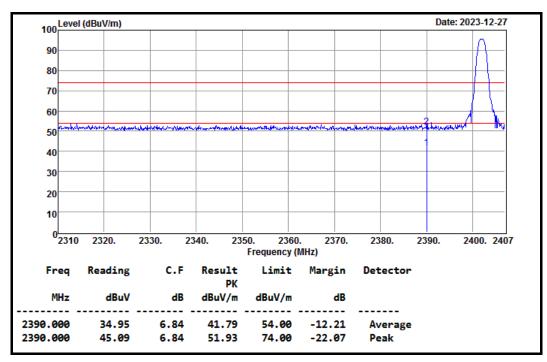
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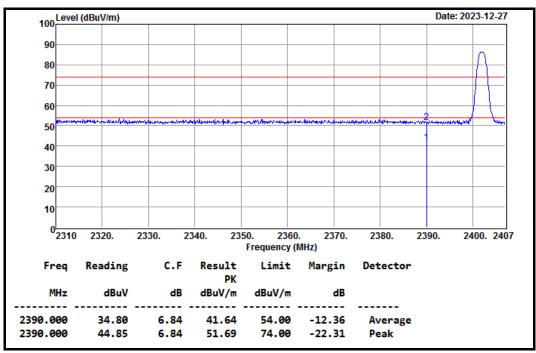
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8.8.4 RESTRICTED BAND EDGES

Product Name	ame AUTOMATIC WIRELESS TURNTABLE Test Date		2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH Low TX / GFSK	TEMP& Humidity	21.8°C, 47%

Horizontal





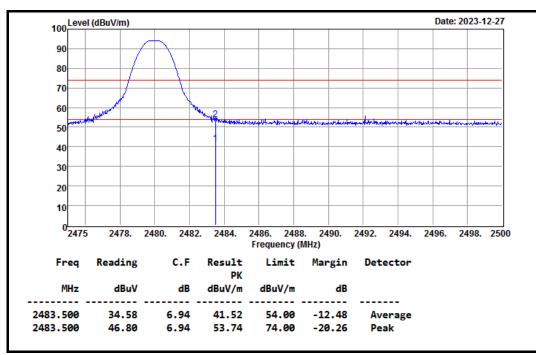


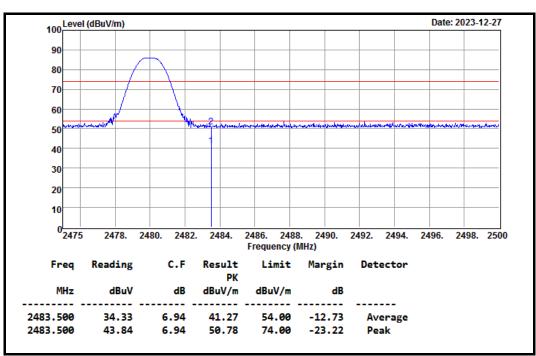
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Product Name	ct Name AUTOMATIC WIRELESS TURNTABLE Test Date		2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH High TX / GFSK	TEMP& Humidity	21.8°C, 47%

Horizontal





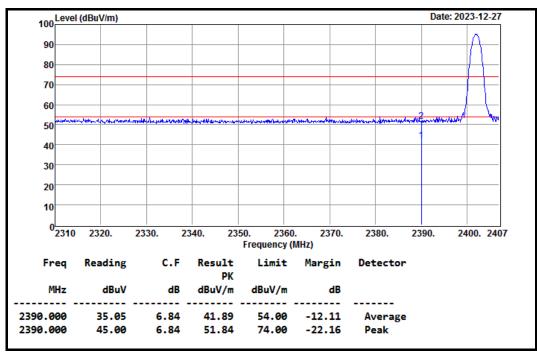


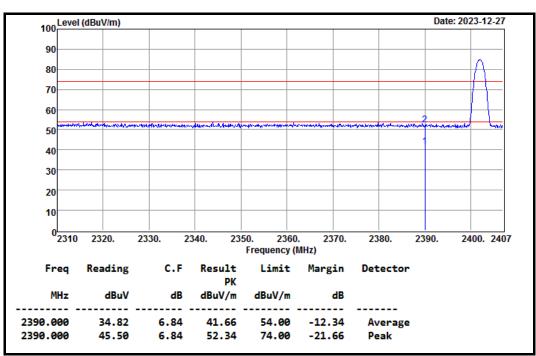
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Product Name	lame AUTOMATIC WIRELESS TURNTABLE Test Date		2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH Low TX / 8-DPSK	TEMP& Humidity	21.8°C, 47%

Horizontal





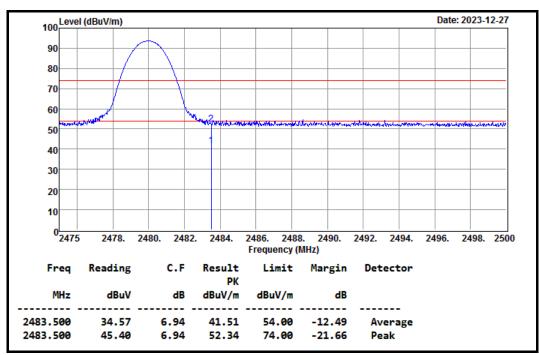


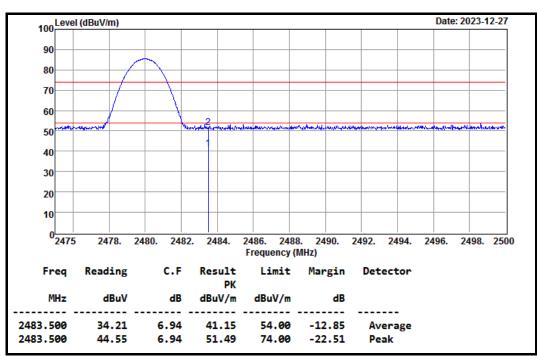
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Product Name	Name AUTOMATIC WIRELESS TURNTABLE Test Date		2023/12/27
Model	AT-LP70XBT	Test By	Peter Chu
Test Mode	CH High TX / 8-DPSK	TEMP& Humidity	21.8°C, 47%

Horizontal







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8.9 POWERLINE CONDUCTED EMISSIONS

LIMITS

§ 15.207 (a) Except as shown in paragraph (b) and (c) this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

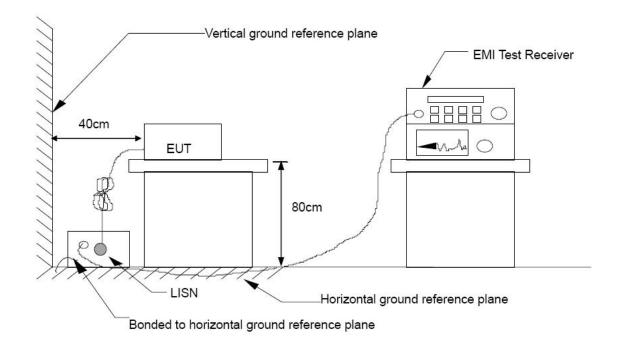
Frequency of Emission (MHz)	Conducted limit (dBµv)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.5 - 5	56	46
5 - 30	60	50

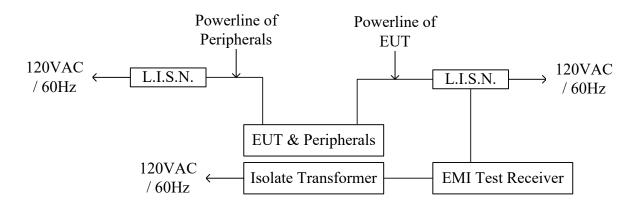


TEST SETUP

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TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80cm above the horizontal ground plane. The EUT IS CONFIGURED IN ACCORDANCE WITH ANSI C63.10: 2013.

The resolution bandwidth is set to 9 kHz for both quasi-peak detection and average detection measurements.

Line conducted data is recorded for both NEUTRAL and LINE.



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TEST RESULTS

Test Voltage: AC 120V, 60Hz

Model No.	AT-LP70XBT	Test Mode	Normal Operation
Environmental Conditions	26.5℃, 44% RH	Resolution Bandwidth	9 kHz
Tested by	Jeremy Zhong		

LINE (The chart below shows the highest readings taken from the final data.) 80 Level (dBuV) Date: 2024-01-10 70 60 50 40 30 20 10 0.150.2 0.5 2 5 10 Frequency (MHz) Freq Reading C.F Result Limit Over Detector Level Limit MHz dBuV dΒ dBuV dBuV dΒ 0.162 19.35 10.43 29.78 55.38 -25.60Average 0.162 37.02 10.43 47.45 65.38 -17.93QΡ 0.175 18.19 10.42 28.61 54.71 -26.10Average 35.77 0.175 10.42 46.19 -18.5264.71 QΡ 0.244 23.15 10.43 33.58 51.95 -18.37Average 0.244 34.95 45.38 61.95 -16.5710.43 QΡ 0.320 26.37 10.47 36.84 49.71 -12.87Average 0.320 35.66 10.47 46.13 59.71 -13.58QΡ 0.535 13.23 10.51 23.74 46.00 -22.26Average 19.42 29.93 0.535 10.51 56.00 -26.07 QΡ 6.22 17.04 2.396 10.82 46.00 -28.96 Average 2.396 12.95 10.82 23.77 56.00 -32.23OP



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Model No.	AT-LP70XBT	Test Mode	Normal Operation
Environmental Conditions	26.5℃, 44% RH	Resolution Bandwidth	9 kHz
Tested by	Jeremy Zhong		

NEUTRAL

14.213

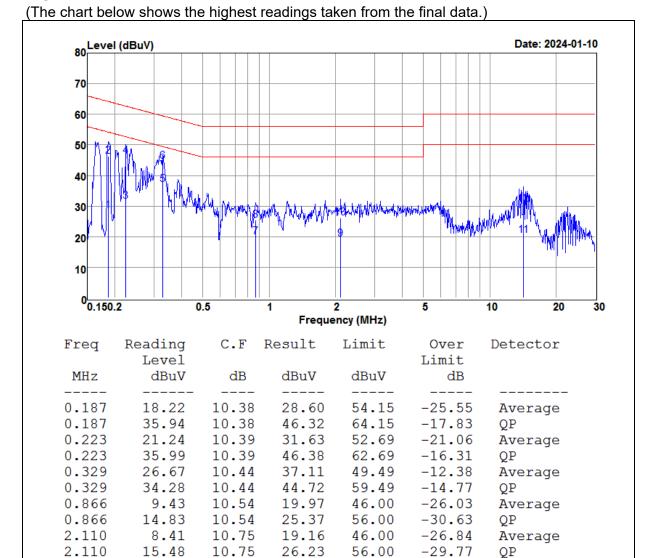
14.213

5.26

15.48

15.12

15.12



=== END of Report ===

50.00

60.00

-29.62

-29.40

Average

QΡ

20.38

30.60